CLAIMS

Claim 1. A die containing at least one embedded system such that when said dice is at rest with one of its face down, said embedded system is in a state whose knowledge allows determination of which face of said die is down.

Claim 2. A die as in Claim 1 that further, using one or more embedded transmission systems, can transmit at least one of:

said state whose knowledge allows determination of which face of said die is down,

the information of which face is down,

the information of which face is up,

the information of what is the value that can be read on the top face.

Claim 3. A die as in Claim 2 where the transmission protocol incorporates an identity of said die so that several dice can be used conjointly and the value on the top face is determined by the identity of the bottom face.

Claim 4. A die as in Claim 2, where the transmission protocol is the Bluetooth protocol.

Claim 5. A die as in Claim 2 where the transmission protocol is one of the versions of the 802.11 protocols of

the Institute of Electronic and Electrical Engineering, such as 802.11b.

Claim 6. A die as in Claim 1 where the energy necessary for said embedded systems comprises one or more batteries, one or more of which is powered by photoelectric cells or a thermoelectric cell or a motion captor or piezoelectricity.

Claim 7. A die as in Claim 1 where the energy necessary for said embedded systems comprises no battery but at least one of one or more transducers and one or more capacitors.

Claim 8. A die as in Claim 2 where the energy necessary for said embedded transmission systems comprises one or more batteries, one or more of which is powered by at least one of a photoelectric cell, a thermoelectric cell, a motion captor, and piezoelectricity.

Claim 9. A die as in Claim 2 where the energy necessary for said embedded transmission systems comprises no battery but one or more transducers and one or more capacitors.

Claim 10. A die as in Claim 6 where the die is replaced when the batteries are "dead" or discharged.

Claim 11. A die as in Claim 2 where the transmission protocol is built ad-hoc.

Claim 12. A die as in Claim 6 where the batteries can be replaced when they are "dead" or discharged.

Claim 13. A die as in Claim 1 where detection of the face that is down uses piezoelectric facets that each senses the weight of the die when they are bellow and support the weight of the die.

Claim 14. A die as in Claim 1 where part or all of the detection of which face of said die is down is based on at least one of gravity, piezoelectricity, the photoelectric effect, and the Peltier effect.

Claim 15. A die as in Claim 2 where part or all of electricity needed by said die is provided using at least one of piezoelectric material, photoelectric material, and some other transducer.

Claim 16. A die as in Claim 1 where the detection of the face that is down does not use any moving part.

Claim 17. A die as in Claim 1 where said die has no moving part.

Claim 18. A die as in Claim 2 where said die has no moving part.

Claim 19. A die as in Claim 1 where the detection of the face that is down uses one or more moving portions of said die, that can be solid, or liquid, or a combination of both.

Claim 20. A die as in Claim 1 where said die is equipped with a memory that keeps account of the outcomes, where

said memory either can be reinitialized by authorized parties or cannot be reinitialized.

Claim 21. A die as in Claim 2 where said die is equipped with a memory that keeps account of the outcomes, where said memory either can be reinitialized by authorized parties or cannot be reinitialized.

Claim 22. A die as in Claim 1 where said die is equipped with a memory that keeps account of the outcomes, where said memory stores also other data such as time of the throws.

Claim 23. A die as in Claim 2 where said die is equipped with a memory that keeps account of the outcomes, where said memory stores also other data such as time of the throws.

Claim 24. A die as in Claim 1 where said die stores information that allows at least one of human agents and the die itself to judge the fairness of said die.

Claim 25. A die as in Claim 2 where said die stores information that allows at least one of human agents and the die itself to judge the fairness of said die.

Claim 26. A die as in Claim 1 where said die stores information and have embedded equipment that allows judging and correcting its fairness.

Claim 27. A die as in Claim 2 where said die stores information and contains embedded equipment that allows judging and correcting its fairness.

Claim 28. A die as in Claim 2 where all or some of the communication from said die is encrypted.

Claim 29. A die as in Claim 1 where the embedded systems are securely protected and also permit one to recognize, and allow one to detect fraudulent attempts to break in the die.

Claim 30. A die as in Claim 2 where the embedded systems are securely protected and also permit one to recognize, and allow one to detect fraudulent attempts to break in the die.

Claim 31. A die as in Claim 29 where said die emits alerts when fairness is not respected and such that the lack of fairness is acknowledged by the dice upon authorized enquiry.

Claim 32. A die as in Claim 28 where communication with the dice about the history of the outcome of their throws cannot be performed without the concourse of some authority, such as a private or government game control agency.

Claim 33. A die as in Claim 1 where said die is cubical as for the game of craps.

Claim 34. A die as in Claim 2 where said die is cubical as for the game of craps.

Claim 35. A die as in Claim 1 where said die has rounded corners such as for the game of 421.

Claim 36. A die as in Claim 2 where said die has rounded corners such as for the game of 421.

Claim 37. A die as in Claim 1 where said die carries values one to six, one value per face.

Claim 38. A die as in Claim 2 where said die carries values one to six, one value per face.

Claim 39. A die as in Claim 1 where said die is a special die such as a die to play poker or Yangtze, a die that carries any set of symbols, either one per face or some repeated some number of times, a die that has a number of faces different from six.

Claim 40. A die as in Claim 2 where said die is a special die such as a die to play poker or Yangtze, a die that carries any set of symbols, either one per face or some repeated some number of times, a die that has a number of faces different from six.

Claim 41. A die as in Claim 1 where part or all of the energy needed by the said embedded system is generated by at least one of a motion captor system and a thermal energy

captor using the Seebeck effect that respectively transform:

the energy in the motion of the dice communicated by the player when throwing said dice,

and the thermal energy communicated by the player when he or she holds the dice before throwing them into electric energy.

Claim 42. A die as in Claim 2 where part or all of the energy needed by said embedded detection and transmission systems is generated by at least one of a motion captor system and a thermal energy captor using the Seebeck effect that respectively transform:

the energy in the motion of the dice communicated by the player when throwing said dice,

and the thermal energy communicated by the player when he or she holds the dice before throwing them into electric energy.

Claim 43. A die as in Claim 42 where the energy produced by said motion captors allows transmission of the state of said die to only persist a short time after each throw.

Claim 44. A die as in Claim 2 where part of the timing of messages being sent and the composition of said messages is decided by a processor in the die.

Claim 45. A die as in Claim 2 where said die transmits to an external computing facility that can analyze the transmission to extract the state of the dice.

Claim 46. A die as in Claim 1 where the state of said die is used in an electronic game such as a video-game using elements of randomness, some or part of said randomness being covered by the use of the die.

Claim 47. A die as in Claim 2 where the state of said die is used in an electronic game such as a video-game using elements of randomness, some or part of said randomness being covered by the use of the die.

Claim 48 A die as in Claim 45 where said computing facility enhances or helps displaying the result of the die game.

Claim 49. A die as in Claim 1 where throws of said die are prompted at some phases of the game, and the state of said die after the throw is recognized and input in the unfolding of the game without any player having any further input to make such as indicating that the throw has been performed and/or that the information sent by said die about its state is complete so that the game can proceed.

Claim 50. A die as in Claim 2 where throws of said die are prompted at some phases of the game, and the state of said die after the throw is recognized and input in the

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unfolding of the game without any player having any further input to make such as indicating that the throw has been performed and/or that the information sent by said die about its state is complete so that the game can proceed.

Claim 51. A die as in Claim 49 where decision on whether the throw of said die had a recognizable output is made by said die or by said dice in synergy with the outside computing facility with some or no exceptions about when some human agent can enter the decision process.

Claim 52. A die as in Claim 1 where the deduction of the value on the tope face of said die from the knowledge of the face that is down is made by a processor in the die.

Claim 53. A die as in Claim 2 where the deduction of the value on the top face of said die from the knowledge of the face that is down is made by a processor in the die.

Claim 54. A die as in Claim 1 where detection of the state of said die is made using photoelectric cells.

Claim 55. A die as in Claim 1 where detection of the state of said die is made using the photoelectric effect and a special board emitting electromagnetic radiations.

Claim 56. A die as in Claim 1 where detection of the state of said die is made using the Peltier effect and a special board emitting heat.

Claim 57. A die as in Claim 2 where detection of the state of said die is made using photoelectric cells.

Claim 58. A die as in Claim 2 where detection of the state of said die is made using the photoelectric effect and a special board emitting electromagnetic radiations.

Claim 59. A die as in Claim 2 where detection of the state of said die is made using the Peltier effect and a special board emitting heat.

Claim 60. A die as in Claim 1 where part or all of the teaching can be realized as MEMS or NEMS size modifications of an usual die.

Claim 61. A die as in Claim 2 where part or all of the teaching can be realized as MEMS or NEMS size modifications of an usual die.

Claim 62. A method for a die to recognize which face is up.

Claim 63. A method for a die to recognize which face is up and for transmitting this information to a computer.

Claim 64. A method for a die to recognize which face is up and for transmitting this information to a computer for display.

Claim 65. A method for a die to recognize which face is up and for transmitting this information to a computer for use in an electronic game.

Claim 66. A method for a die to recognize which face is up and keep the history of such die values.

Claim 66. A method for a die to recognize which face is up and keep the history of such die values in a secure way.

Claim 67. A method for a die to recognize which face is up, to keep the history of such die values and to check its own fairness.

Claim 68. A method for a die to recognize which face is up, to keep the history of such die values, to check its own fairness, and to correct it.

Claim 69. A method for a die to recognize which face is up, to keep the history of such die values, to check its own fairness, and correct it in a deterministic way.

Claim 70. A method for a die to recognize which face is up, to keep the history of such die values, to check its own fairness, and correct it in a random way.